

Attorney Docket No.: F3347(C)  
Serial No.: 10/583,231  
Filed: May 17, 2007  
Confirmation No.: 8228

**REMARKS**

***Amendments to the Claims***

The following amendments are made in an earnest effort to advance prosecution of the application.

Claim 1 has been amended without prejudice and new claim 21 introduced to recite preferred embodiments of applicants' invention which are more clearly differentiated from the prior art.

Amended claim 1 specifies that the acid component of the carbon dioxide generating system is selected from ascorbic acid, succinic acid and mixtures thereof as disclosed on page 4, lines 29-31; that the carbonate is not a calcium carbonate as disclosed on page 15, lines 13-18; that the molar ratio of the amount of acid to carbonate present in the carbon dioxide generating composition is from about 1:2 to about 2:1 as disclosed in original claim 6; and that the carbon dioxide generating system does not contain citric acid as drawn from the conclusions stated from the modeling data on page 16, lines 4-11 and the comparative examples.

New claim 21 specifies that the acid recited in claim 1 is ascorbic acid as disclosed on page 16, lines 14-15.

Claims 3-6, 13, 19 and 20 are hereby canceled without prejudice.

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### ***Claims Objections***

Claims 18-20 were objected to because the Examiner held the claims were substantially duplicate. These objections are rendered moot since claims 19-20 have been canceled without prejudice.

### ***Claim Rejections – 35 USC § 112***

Claim 13 was rejected under 35 USC §112, second paragraph, as being indefinite. This rejection is rendered moot since claim 13 has been canceled without prejudice.

### ***Claim Rejections – 35 USC § 102/103***

**Claims 1-15 were rejected under 35U.S.C. 102(b) as being anticipated by or, in the alternative under 35 USC §103(a) as being obvious over Cain et al (EP1245156 A2) in view of Hara (EP0191487 A2).** Applicants respectfully request the Examiner's reconsideration in view of the above amendments and following remarks.

#### **Statement of Facts**

Cain discloses an edible anhydrous fat based system (premix) which comprises acids (citric, malic, tartaric, maleic, lactic and acetic acids and their salts) and bases (including carbonate and bicarbonate salts of calcium, sodium and potassium) [page 2, lines 39-40; examples 1, 2 & 7; claim 6].

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Cain is silent regarding a frozen confection in which a carbon dioxide generating system is used to aerate the confection on contact with water to generate any specific overrun. Cain in fact does not disclose even in connection with baking, that the disclosed edible anhydrous fat based system of the invention is used as a leavening agent. Thus, the concept of overrun is not relevant in the context of Cain and is not discussed by Cain.

Cain does not teach premixes containing ascorbic or succinic acid.

Cain does not teach a carbon dioxide generating system which specifically does not contain citric acid. Quite the contrary: in all the working examples wherein a structured particulate formulation is incorporated in a food product (baked product), the acid is citric acid (Examples 2-11 employ Structured Particulate Formulation No. 1 of Table 1 which is based on citric acid).

Cain does not teach a carbon dioxide generating systems which specifically does not contain a calcium carbonate.

Hara discloses "compositions for multi-cellular foods such as ice cream, bavarian cream or mousse which comprise gelatin, alginic acid and/or sodium alginate, edible fats and oils such as vegetable oil, animal oil, coconut oil, palm oil etc., and balance of water and which may optionally be overrun, the composition makes it possible to improve the multi-cellular food products in their shape retaining ability even at a relatively high temperature and in the resistance to water separation from the thawed food products, and these properties being maintained even when the acidic foods such as fruit juice or jam or sour milk beverages are added thereto, furthermore, the composition being solidified at a relatively high temperature, thus the process for manufacturing multi-cellular foods can greatly be simplified". (Abstract emphasis added)

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Hara teaches that the overrun is generated by "whipping" (page 10, 3<sup>rd</sup> paragraph) or by ("a conventional technique") , not by an acid-base reaction.

Hara does not mention succinic or ascorbic acid.

Hara does not teach a carbon dioxide generation system, let alone one that does not contain citric acid or a calcium carbonate.

In contrast, applicants' invention recited in amended claim 1 is directed to the use of an acid - base reaction to generate carbon dioxide, thereby forming a foamed confectionery product (e.g. ice cream), without the need for mechanical aeration, e.g., whipping. Carbon dioxide generating systems (e.g. citric acid and sodium bicarbonate) have been used previously in food products, for example to produce a fizzing sensation (e,g, as in Cain et al). However, in these products, the gas is simply released and not used to form a foam. Another problem with the previous systems is that using an acid can potentially result in a product which is too acidic - which is undesirable in foods such as ice cream.

The current invention solves these problem by selecting particular diprotic acids, selected from ascorbic acid, succinic acid and their mixtures which allows the formation of foams with high overrun using an acid-base reaction, but without the resulting product having a low pH.

#### Applicants' Arguments

MPEP 706.02 states

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"...for anticipation under 35 U.S.C. 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present."

Applicants' submit that their amended claims recite at least the following elements not disclosed either explicitly or implicitly in Cain, Hara or their combination:

- *A carbon dioxide generation system that is used to aerate a frozen confection to achieve an overrun of at least 30% that specifically does not contain citric acid or a calcium carbonate.* All the examples disclosed by Cain are directed to baked goods (muffins, cookies), which incorporate an edible anhydrous fat based system specifically based on citric acid and sodium bicarbonate. The system is used to provide novel flavor effects during eating (effervescence – Example 4) or novel appearance (flavor components float to surface – Example 6).

- *A carbon dioxide generation system in which the acid component is selected from ascorbic acid, succinic acid and their mixtures.* Neither Cain nor Hara mention ascorbic acid or succinic acid.

- *A confectionary product in which a premix, when mixed with water, gives an aerated confectionery product which in the absence of mechanical aeration, has an overrun of at least about 30%.* As mentioned above, Cain is silent regarding a frozen confection in which a carbon dioxide generating system is used to aerate the confection on contact with water to generate any specific overrun. Cain does not disclose even in connection with baking, that the disclosed edible anhydrous fat based system of the invention is used as a leavening agent. Thus, the concept of overrun is not relevant in the context of Cain and is not discussed by Cain. Furthermore, Hara specifically

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teaches that the overrun is generated by whipping (page 10, 3<sup>rd</sup> paragraph) or by (“a conventional technique”), not by any acid base reaction which generates CO<sub>2</sub>.

Absent a disclosure of the above elements either explicitly or implicitly, neither Cain et al nor Hara can anticipate applicants’ amended claims under 35 USC §102(b).

Applicants further submit that their claims are not rendered obvious under 35 USC §103(a) by Cain and Hara. To qualify as a 103(a) reference “The prior art reference, or combination of references, must teach or suggest all of the claim limitations (MPEP §2143). In addition to providing at least a suggestion of all the claim limitations, both the suggestion and the reasonable expectation of success must be found in the prior art references, not in Appellant’s disclosure” (See *In re Vaeck*, 20 U.S.PQ.2d 1438, 947 F.2d 448 (Fed Cir. 1991)).

Cain and Hara are directed to different objective technical problems from applicants’ invention. The goal of Cain et al is to deliver novel flavor and appearance effects to baked goods for which citric acid is entirely suitable, while Hara is directed to shape retention in multicellur foods which are aerated by mechanical means. In contrast, applicants invention is directed to frozen confections such as ice cream which are aerated by a carbon dioxide generation system, which comprises specific acids not disclosed by Cain and Hara and excludes citric acid, in the absence of mechanical aeration.

Absent a disclosure of the of the elements discussed above, the references do not present a *prima facie* case of obviousness over applicants’ amended claims.

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**Claims 1-3, 7-9, 11 and 13-15 were rejected under 35U.S.C. 102(b) as being anticipated by or, in the alternative under 35 USC §103(a) as being obvious over Nayyar et al (US 5,853,785).** Applicants respectfully request the Examiner's reconsideration in view of the above amendments and following remarks.

**Statement of Facts**

Nayyar is directed to "a dry mix for preparing a slush beverage. When the dry mix is dissolved in water at a 15% solids level, the liquid has an onset melting point greater than -6.5.degree. C. and a viscosity of less than 10 mPas at 14.7.degree. C. The mix contains at least 2% of water-soluble, low-viscosity hydrocolloid and preferably contains insoluble particles to function as an ice crystal nucleating agent". Abstract

Nayyar discloses that the premix may contain a carbonate or bicarbonate salt and an acid, in order to release carbon dioxide [Col 4, lines 12-14]. Nayyar further teaches that "the presence of carbonating salts in the dry mix has been found to both further facilitate the development of fine grained ice crystals and to provide a pleasant, refreshing, organoleptic effect". (Column 4, lines 6-10)

Column 3, lines 34-36 of Nayyar teaches that fruit-flavored mixes, such as lemon and grape, will typically contain an amount of food acid in order to provide the tart taste associated with these flavours. Examples 1,2,4,5 and 6 teach citric acid as the acid component.

Nayyar is silent regarding ascorbic acid or succinic acid.

Applicants' invention has already been discussed.

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Applicants' arguments

Applicants' submit that their amended claims recite at least the following elements not disclosed either explicitly or implicitly in Nayyar:

- *A carbon dioxide generation system that is used to aerate a frozen confection to achieve an overrun of at least 30% that specifically does not contain citric acid or calcium carbonate.* All the examples taught by Nayyar, which incorporate a bicarbonate-acid system, teach the use of citric acid.

Regarding overrun, the Examiner held that since the Patent Office is not equipped to manufacture prior art products, and compare claimed products with that of the prior art, the burden is shifted to applicants to show that the product of the references does not contain the claimed overrun (30% claim 1 and 70% claim 8).

Applicants' agent respectfully points out that in aeration generated by a CO<sub>2</sub> generating systems, the overrun can be calculated from the levels of bicarbonate and acid disclosed in the composition through the use of the following chemical equation:



When citric acid is in relatively large molar excess as in Nayyar, Examples 1,2 3, 5 and 7, the bicarbonate component is stoichiometrically limiting. In this case the maximum volume of CO<sub>2</sub> gas generated at STP by the reaction is to a good approximation given by;

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$$\text{Volume CO}_2 \text{ gas at STP} = 22.4 \text{ liter/mole CO}_2 \times (\text{grams (NaHCO}_3)/84 \text{ (gm/mole(NaHCO}_3)) \times (6 \text{ mole (CO}_2)/6 \text{ mole (NaHCO}_3)}$$

The % overrun is then given by:

$$\% \text{ Overrun} = (\text{Volume of CO}_2 \text{ generated}/ \text{Volume of mix without the CO}_2) \times 100$$

Theoretical overruns computed from the above stoichiometric analysis for Examples 1,2 3, 5 and 7 of Nayyar are set forth in the following table (a value of 1.12 gm/cm<sup>3</sup> was assumed for the density of the aqueous mix in each example).

Component	Ex 1	EX 2	Ex 4	Ex 5	Ex 7
Grams sodium bicarbonate	0.51	0.53	0.53	0.52	0.50
Grams Dry Mix	150	143	143	144	153.7
Grams Water	830	826	826	826	826
Volume mix (cm <sup>3</sup> )	875	865	865	866	874.7
Volume CO <sub>2</sub> generated (cm <sup>3</sup> )	136	141	141	138.5	133
Overrun	15.5%	16.3%	16.3%	16.0%	15.24%

As can be seen from the above table, the maximum theoretical overruns developed in the products disclosed by Nayyar are about half of the lowest overrun (30%) recited in applicants' claimed invention. Consequently, applicants submit that the compositions disclosed by Nayyar does not reasonably teach an overrun of at least 30%, let alone an overrun of 70%.

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- Nayyar does not disclose a *carbon dioxide generation system in which the acid component is selected from ascorbic acid, succinic acid and their mixtures*. These acids are not explicitly mentioned by Nayyar. Although the Examiner correctly pointed out that lemons naturally contain ascorbic acid, lemons contain an even greater proportion of citric acid which is the primary acid in lemon juice (see for example wikipedia.com). Thus, adding lemon juice would also inevitably result in the addition of citric acid which is excluded in amended claim 1.

Absent a disclosure of the above elements either explicitly or implicitly, Nayyar can not anticipate applicants' amended claims under 35 USC §102(b).

Applicants further submit that their claims are not rendered obvious by Nayyar under 35 USC §103(a).

Nayyar is directed to a different objective technical problems from applicants' invention. The goal of Nayyar is a dry mix to make slush beverages. Nayyar teaches that "the presence of carbonating salts in the dry mix has been found to both further facilitate the development of fine grained ice crystals and to provide a pleasant, refreshing, organoleptic effect" and not to aerate a frozen confection such as ice cream to an overrun of at least 30%.

Absent a disclosure of the of the elements discussed above, Nayyar does not present a *prima facie* case of obviousness over applicants' amended claims.

**Claims 16-17 were rejected under 35U.S.C. 35 USC §103(a) as being unpatentable over Nayyar et al (US 5,853, 785) and evidenced by rahabadvisor.pathnet.org. Applicants respectfully request the Examiner's reconsideration in view of the above amendments and following remarks.**

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Nayyar et al was already discussed.

rahabadvisor.pathnet.org was relied upon for teaching that freezers are kept to a temperature of about negative 17 to -15° C.

rahabadvisor.pathnet.org does not remedy the shortcomings of Nayyar as a 103(a) reference over amended claim 1. Consequently the combination of Nayyar and rahabadvisor.pathnet.org does not render claims 16-17 obvious at least because these claims incorporate all the limitations of claim 1.

**Claims 4-6, 10, 12, 18-20 were rejected under 35U.S.C. 35 USC §103(a) as being unpatentable over Nayyar et al (US 5,853, 785) in view of Cain et al (EP1245156 A2).** Applicants respectfully request the Examiner's reconsideration in view of the above amendments and following remarks

Cain, Nayyar and applicants' invention have already been discussed.

**Applicants arguments**

The combination of Cain and Nayyar do not disclose at least the following elements recited in applicants' amended claim 1

*- A carbon dioxide generation system that is used to aerate a frozen confection to achieve an overrun of at least 30% that specifically does not contain citric acid or calcium carbonate.* Cain and Nayyar both teach citric acid as a preferred acid.

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- A carbon dioxide generation system in which the acid component is selected from ascorbic acid, succinic acid and their mixtures. Nayyar and Cain are silent about ascorbic acid or succinic acid. Although the Examiner correctly pointed out that lemons naturally contain ascorbic acid, lemons contain an even greater proportion of citric acid which is the primary acid in lemon juice (see for example wikipedia.com). Thus, adding lemon juice would also inevitably result in the addition of citric acid which is excluded in amended claim 1.

- A confectionary product in which a premix when mixed with water gives an aerated confectionery product which in the absence of mechanical aeration, has an overrun of at least about 30%. As mentioned above, Cain is silent regarding a frozen confection in which a carbon dioxide generating system is used to aerate the confection on contact with water to generate any specific overrun. Cain in fact does not disclose even in connection with baking, that the disclosed edible anhydrous fat based system of the invention is used as a leavening agent. Thus, the concept of overrun is not relevant in the context of Cain and is not discussed. Furthermore, Nayyar discloses beverage compositions which have at most an overrun of 15% as discussed above.

Nayyar and Cain are directed to different objective technical problems from applicants invention. Absent a disclosure of the elements discussed above, the combination of Nayyar and Cain does not present a *prima facie* case of obviousness over applicants' amended claims.

### **Unexpected Results**

One of the differences between Cain / Nayyar and amended claim 1 is that the prior art does not disclose a carbon dioxide-generating composition comprising an acid selected from ascorbic acid, succinic acid and mixtures thereof which does not contain

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either citric acid or a calcium carbonate . The inventors have surprisingly found that using these particular acids and bases has the result that aerated products with high overrun can be generated without resulting in a low pH. Furthermore these systems can be controlled better because the pH is not as sensitive to small changes in composition.

Examples 1 and 2 of the present application, which contain ascorbic acid, give high overrun and good pH values (i.e., products which are not too acidic) whereas Example 3 to 5, which use citric acid give either low overrun or low pH.

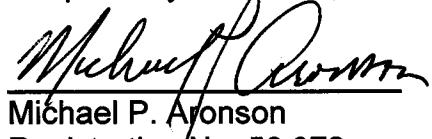
Example 7 shows that ascorbic and succinic acids are diprotic acid which because of their pKa values have pH vs acid concentration curves that have a shallow slope in the region pH 5 to pH 6. This means that small changes in acid concentration do not result in large changes in pH (see page 16, lines 4-11), unlike, for example citric acid, which is the acid exemplified in both Cain and Nayyar. This means that the desired pH and overrun can be more easily achieved by using ascorbic or succinic acid than by using citric acid.

In view of the foregoing amendment and remarks, applicants respectfully request that the application be allowed to issue.

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If a telephone conversation would be of assistance, Applicant's undersigned agent invites the Examiner to telephone at the number provided.

Respectfully submitted,

  
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